# SECTION XI
# Specifications

## 11.1 PHYSICAL/ENVIRONMENTAL

| | |
|---|---|
| **Size** | 4.1 in. H x 11.9 in. W x 10.1 in. D (104 mm x 302 mm x 257 mm). Height dimension includes feet; depth dimension does not include front- and rear-panel connectors. |
| **Weight** | 13 lb (6 kg) |
| **Temperature** | |
| **Operating** | +50 to +104° F (+10 to +40° C) |
| **Storage** | -4 to +158° F (-20 to +70° C) |
| **Relative Humidity** | 30 to 90% (noncondensing) |
| **Elevation** | 0 to 10,000 ft (0 to 3,000 m) |

## 11.2 COMPONENTS AND USER INTERFACE

| | |
|---|---|
| **Display** | |
| **Type** | Vacuum fluorescent and LEDs |
| **Display Area** | 140.6 mm x 35 mm (5.5 x 1.4 inches) |
| **Resolution** | 256 x 64 pixels |
| **Pixel Size** | 0.4 x 0.4 mm |
| **Character Set** | Software-Defined |

## 11.3 CONTROLS AND INDICATORS

| | |
|---|---|
| **Front Panel** | ON/STANDBY; FREEZE; MENU; PULSE TONE VOLUME, up and down; ALARM SILENCE; ALARM SILENCE indicator; Battery Charging Indicator; Function Keys (4), software-configured |
| **Rear Panel** | Mains AC power ON/OFF control |

## 11.4 CONNECTORS

| | |
|---|---|
| **Front Panel** | Connector for mainstream $CO_2$; sensor cable; connector for oximetry sensor |
| **Rear Panel** | Power cord receptacle; fuse block; RS-232-compatible serial output port; input for *C-LOCK* ECG synchronization, 3/32-inch monophonic phone jack |

## 11.5 PERFORMANCE

**Capnograph Measurement Range**

| | |
|---|---|
| **$CO_2$ Concentration** | 0 to 99 mmHg |
| **Respiration Rate** | 0 to 150 breaths/minute |
| **$CO_2$ Accuracy**[1] | 0–40 mmHg, ±2 mmHg<br>41–99 mmHg, ±5% of reading (increasing linearly 0.8% for every 10 mmHg) |
| **Response Time** | Less then 60 ms. |
| **Alarms** | Apnea; Sensor Disconnect; High/Low $ETCO_2$; High/Low breath rate; High/Low inspired $CO_2$ |

**Pulse Oximeter**

| | |
|---|---|
| **Display Ranges** | |
| **$SpO_2$** | 0 to 100% |
| **Pulse Rate** | 20 to 250 beats/minute (bpm) |
| **Pulse Rate Accuracy** | ±3 bpm |
| **Saturation Accuracy**[2] | (% $SpO_2$ ±1 standard deviation)[3] |
| | **Adults** 70% to 100%: ± 2 digits<br>50% to 69%: ± 3 digits<br>0 to 49%: unspecified |
| **Calibration Stability** | Less than 1% outside accuracy specifications after 12 months of continuous operation. |
| **Wavelengths** | 660 nm (red, nominal); 920 nm (infrared, nominal) |
| **Heating** | No heater: less than 50 mW total heat dissipation by LEDs (typically less than 1° C temperature rise) |
| **Alarms** | Pulse Search; High/low $SpO_2$; High/low pulse rate; $SpO_2$ Sensor Disconnect |

1. This accuracy specification is based on the following standard airway conditions: airway adapter temperature = 33°C; water vapor pressure = 38 mmHg; standard gas mixture = $CO_2$ in balance air, fully hydrated at 33°C; barometric pressure = 760 mmHg.
2. These saturation accuracy specifications are based upon testing with *OXISENSOR* D-25 oxygen transducer. Testing to verify these specifications is done against *NELLCOR* N-200 pulse oximeters with *OXISENSOR* D-25 oxygen transducers that have been previously validated for accuracy against an Instrumentation Laboratory CO-Oximeter. For specifications of accuracy with other *NELLCOR* sensors, please refer to the sensor package insert.
3. 68% of the measurements across the population will be within ±1 standard deviation.

$CO_2$ Sensor

| | |
|---|---|
| **Type** | Mainstream (on airway) |
| **Principle of Operation** | Nondispersive Infrared, Single-beam, single-frequency, Fully-chopped, ratiometric |
| **Operating Temperature** | 42° C nominal |
| **Size** | Less than 12.5 mm (0.5 in) |
| **Weight** | Less than 10 g |
| **Cable length** | 3 m (9.84 ft) |

**11.6 CALIBRATION** — Annual accuracy check; no user calibration required.

**11.7 AIRWAY ADAPTER** — Less than 6 cc dead space; single-patient use only

**11.8 ELECTRICAL**

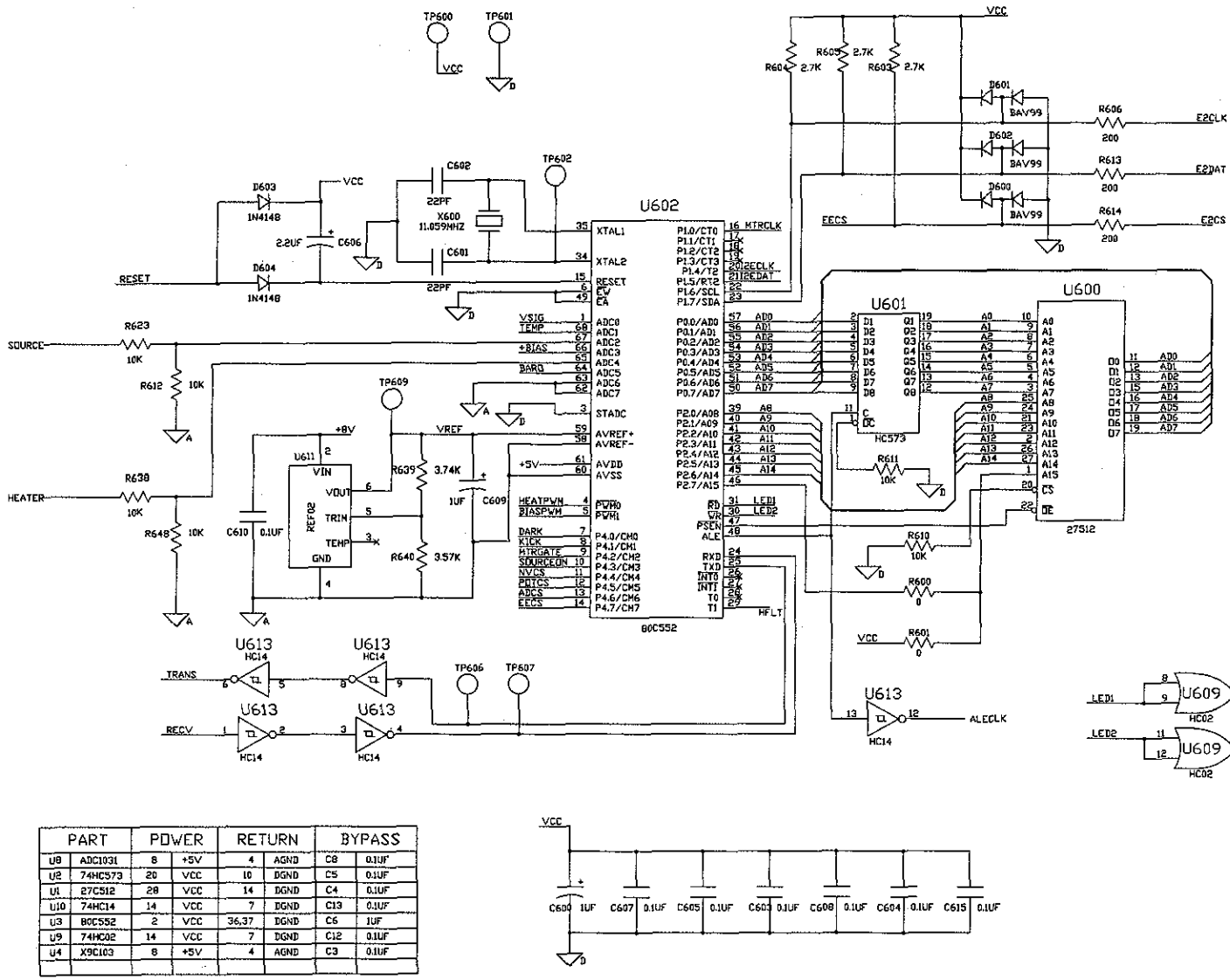
| | | |
|---|---|---|
| **Power requirement** | 100/120V~ 50/60 Hz, 500 mA<br>220/240V~ 50/60 Hz, 250 mA | |
| **Digital/Analog Input Voltages** | ±30 VDC, maximum | |
| **Leakage Current** | 10 µA maximum from patient connections to ground or AC mains; 100 µA maximum from AC mains to chassis ground. | |
| **Battery** | **Type** | Sealed lead acid |
| | **Operating Time (fully charged)** | 90 minutes nominal, 180 minutes without graphics |
| | **Recharge period** | 12 hours typical |
| | **Charger type** | Internal, current limited, constant voltage |
| | **Battery fuse** | 1 X T 2.5 A, 250V, 3AG |
| **AC Fuses** | **100/120 V~** | 1 X T 1.0-A, 250V, 3AG |
| | **220/240 V~** | 2 X T 0.5 A, 5x20 mm |
| **Protective Class** | IEC Class I | |
| | Type BF (patient electrically isolated) | |

# SECTION XII
# Schematic Diagrams

## 12.1 INTRODUCTION

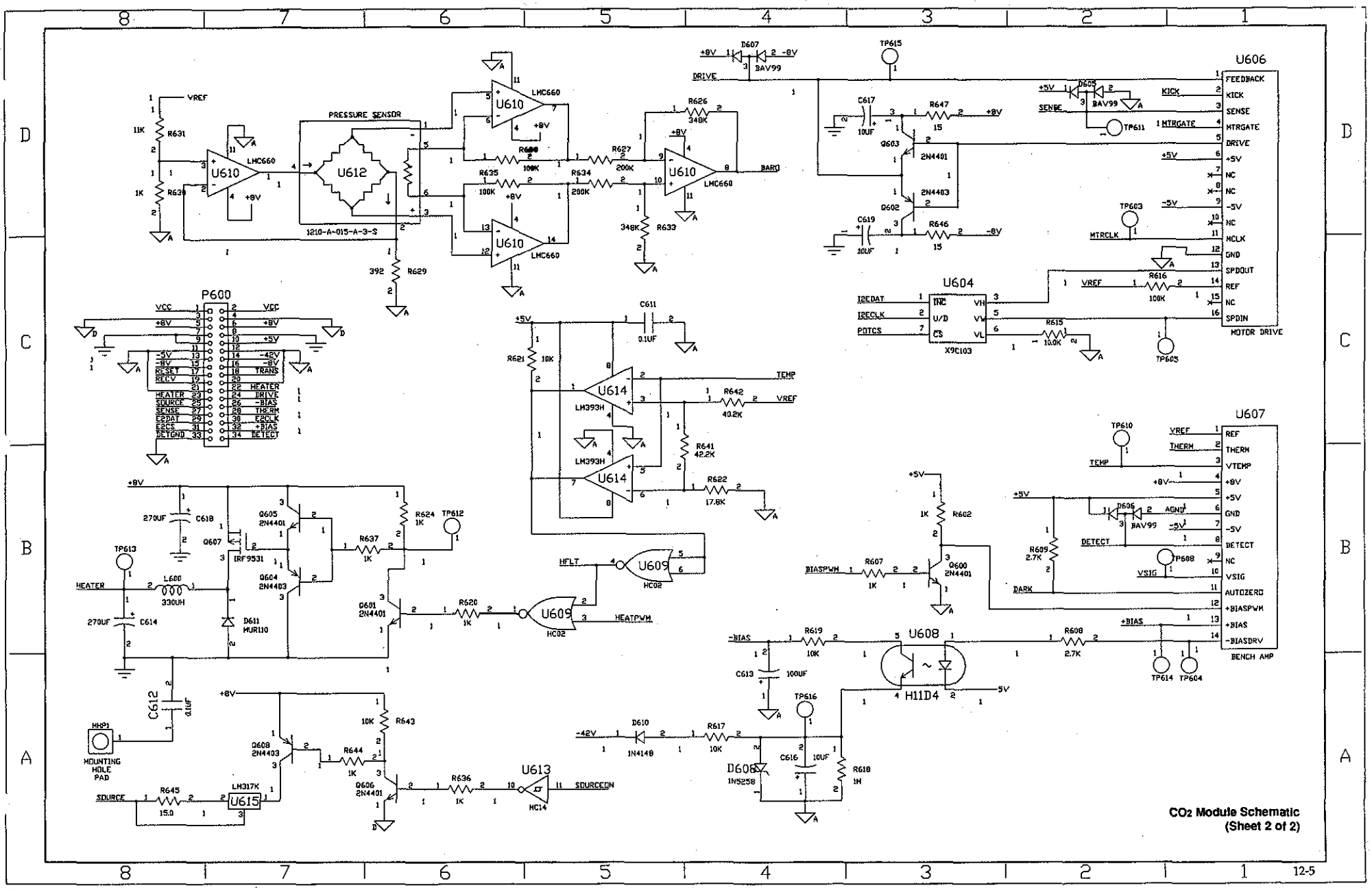
This section contains schematic diagrams for the N-6000. The following diagrams are included:

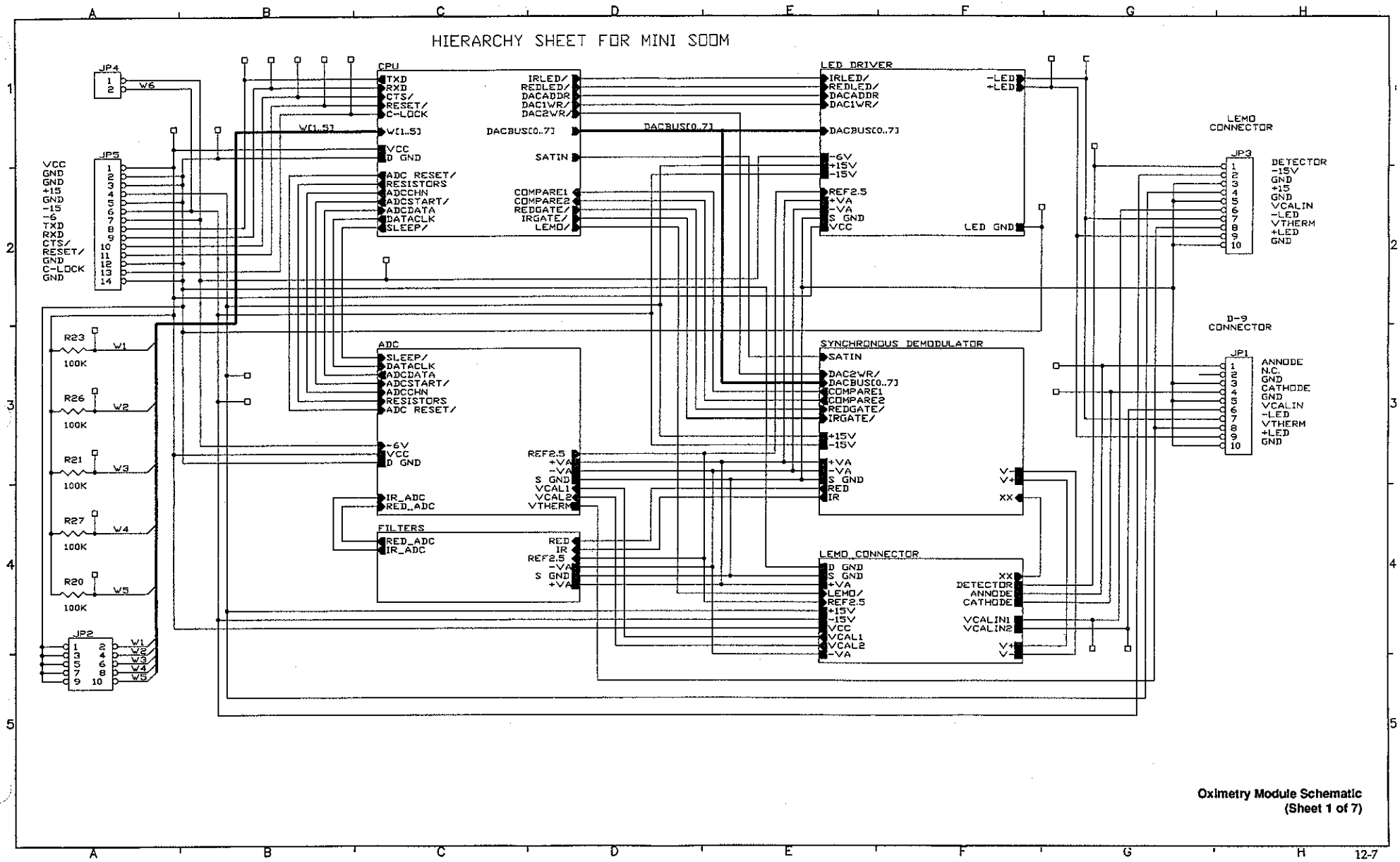

| Schematic Diagram | Page |
|---|---|
| $CO_2$ Module | 12-3 |
| Oximetry Module | 12-7 |
| Main Processor | 12-21 |
| Power Supply-Charger | 12-37 |

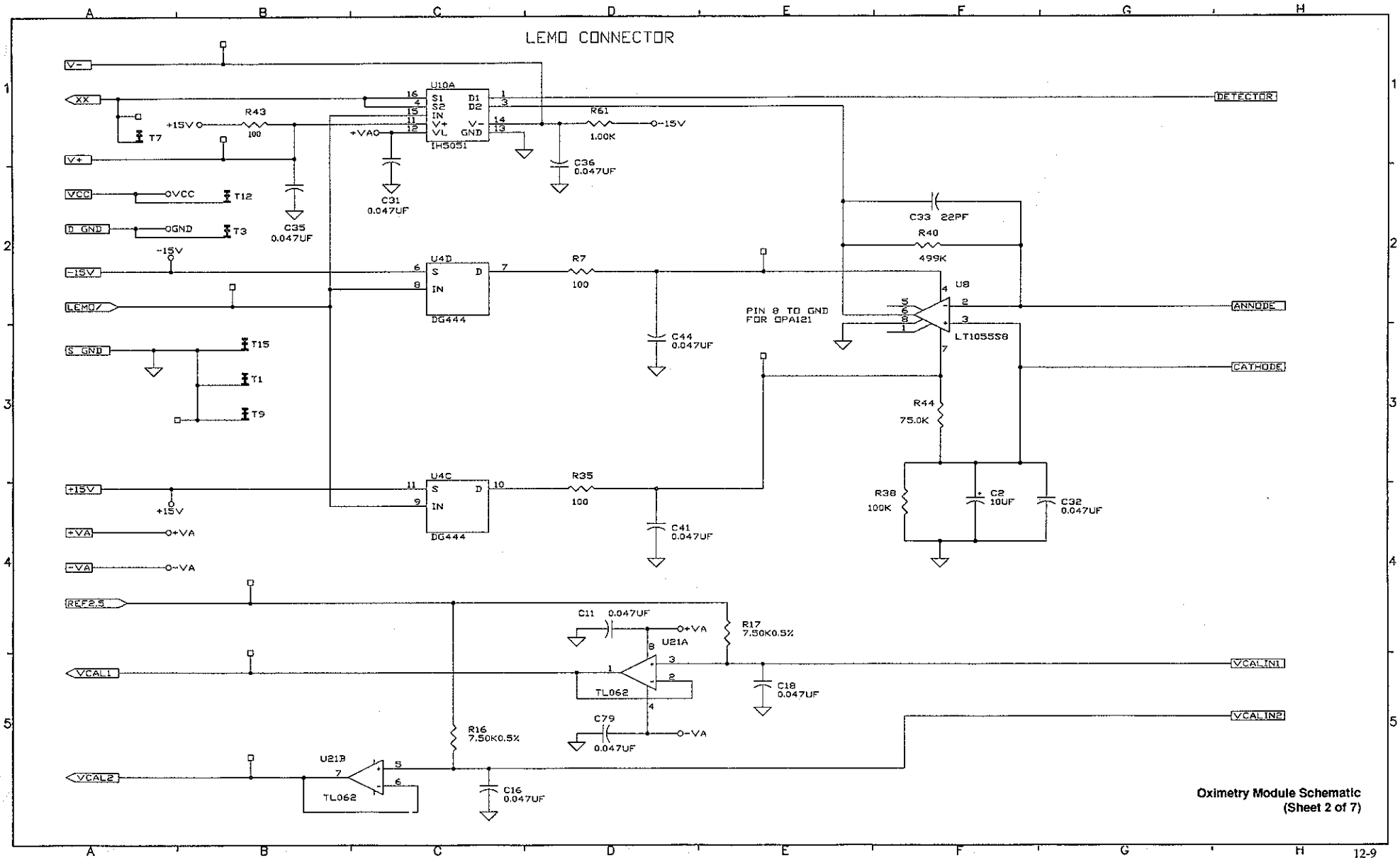


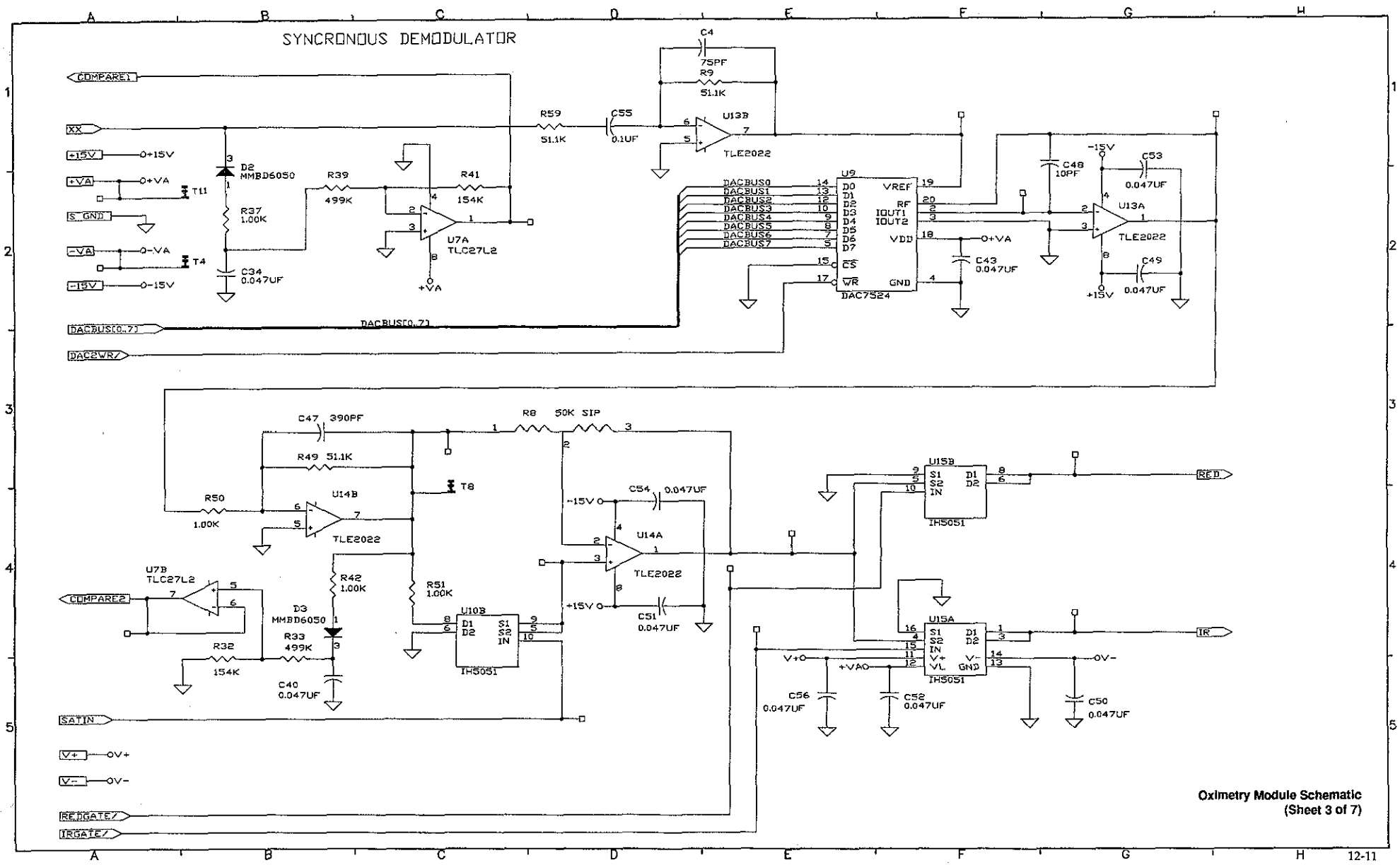

| PART | | POWER | | RETURN | | BYPASS | |
|---|---|---|---|---|---|---|---|
| U8 | ADC1031 | 8 | +5V | 4 | AGND | C8 | 0.1UF |
| U2 | 74HC573 | 20 | VCC | 10 | DGND | C5 | 0.1UF |
| U1 | 27C512 | 28 | VCC | 14 | DGND | C4 | 0.1UF |
| U10 | 74HC14 | 14 | VCC | 7 | DGND | C13 | 0.1UF |
| U3 | 80C552 | 2 | VCC | 36,37 | DGND | C6 | 1UF |
| U9 | 74HC02 | 14 | VCC | 7 | DGND | C12 | 0.1UF |
| U4 | X9C103 | 8 | +5V | 4 | AGND | C3 | 0.1UF |

**CO2 Module Schematic**
**(Sheet 1 of 2)**

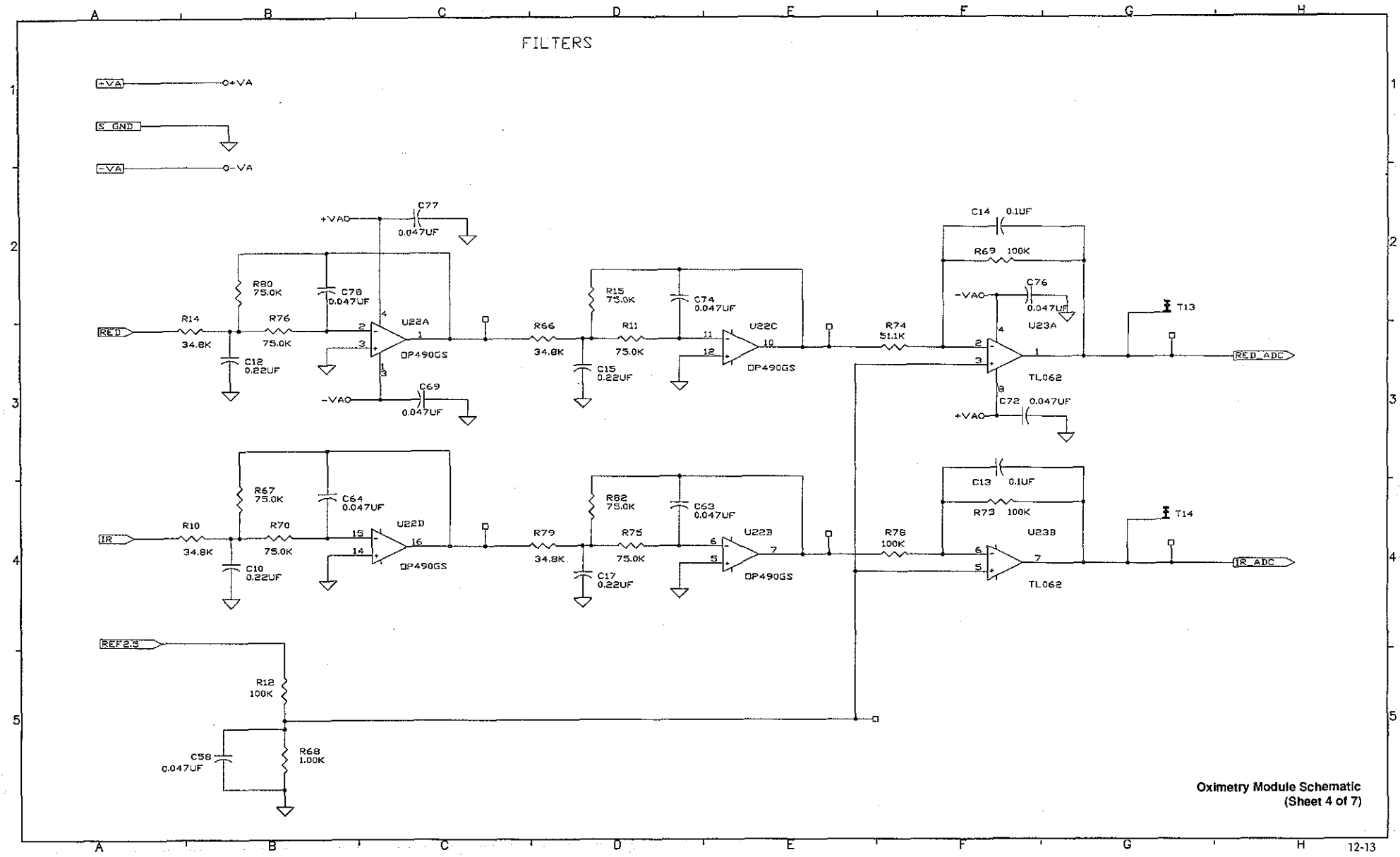

U606
U604
U607
U610
U612
U614
U609
U608
U613
U615
P600
MOTOR DRIVE
X9C103
BENCH AMP
PRESSURE SENSOR
1210-A-015-A-3-S
LMC660
LM393H
HC02
HC14
H11D4
LM317K
IRF9531
MUR110
1N4148
1N5258
BAV99
2N4401
2N4403
MOUNTING HOLE PAD
FEEDBACK
KICK
SENSE
MTRGATE
DRIVE
MTRCLK
SPDOUT
SPDIN
REF
VTEMP
THERM
AUTOZERO
+BIASPWM
+BIAS
-BIASDRV
DETECT
VSIG
DARK
HEATPWM
SOURCECON
HFLT
TEMP
VREF
CO2 Module Schematic
(Sheet 2 of 2)
12-5

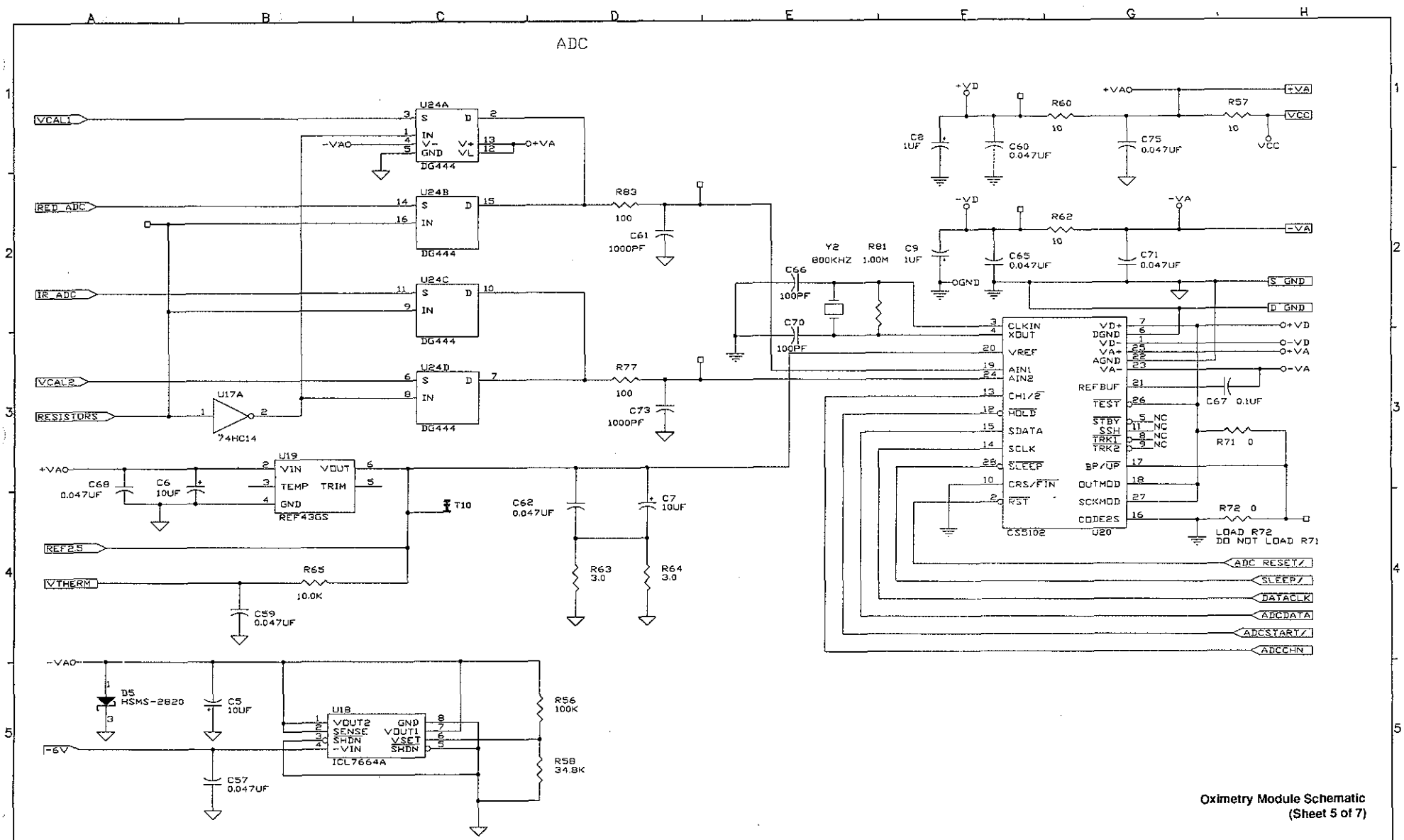

HIERARCHY SHEET FOR MINI SOOM
CPU
LED DRIVER
ADC
SYNCHRONOUS DEMODULATOR
FILTERS
LEMO_CONNECTOR
LEMO CONNECTOR
D-9 CONNECTOR
JP1
JP2
JP3
JP4
JP5
R23
R26
R21
R27
R20
100K
W1
W2
W3
W4
W5
W6
DETECTOR
ANNODE
CATHODE
VCALIN
VTHERM
+LED
-LED
GND
Oximetry Module Schematic
(Sheet 1 of 7)
12-7


LEMO CONNECTOR
V-
XX
V+
VCC
D GND
-15V
LEMO/
S GND
+15V
+VA
-VA
REF2.5
VCAL1
VCAL2
DETECTOR
ANNODE
CATHODE
VCALIN1
VCALIN2
U10A
IH5051
U4D
DG444
U4C
DG444
U8
LT1055S8
U21A
TL062
U21B
TL062
R43
100
R61
1.00K
R7
100
R35
100
R40
499K
R44
75.0K
R38
100K
R17
7.50K0.5%
R16
7.50K0.5%
C31
0.047UF
C35
0.047UF
C36
0.047UF
C33 22PF
C44
0.047UF
C41
0.047UF
C2
10UF
C32
0.047UF
C11 0.047UF
C18
0.047UF
C79
0.047UF
C16
0.047UF
T7
T12
T3
T15
T1
T9
PIN 8 TO GND
FOR OPA121
Oximetry Module Schematic
(Sheet 2 of 7)
12-9



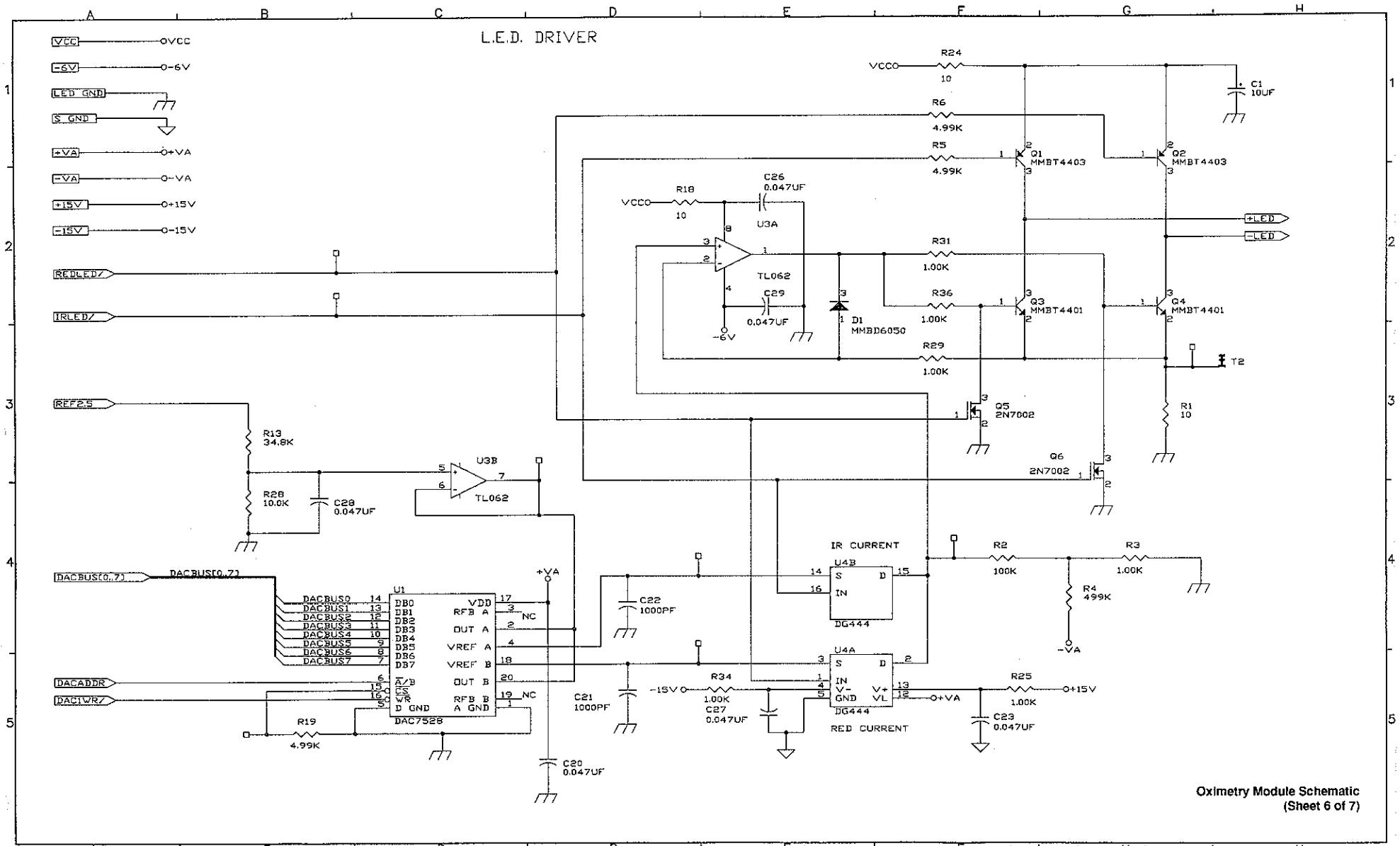

**Oximetry Module Schematic**
**(Sheet 3 of 7)**

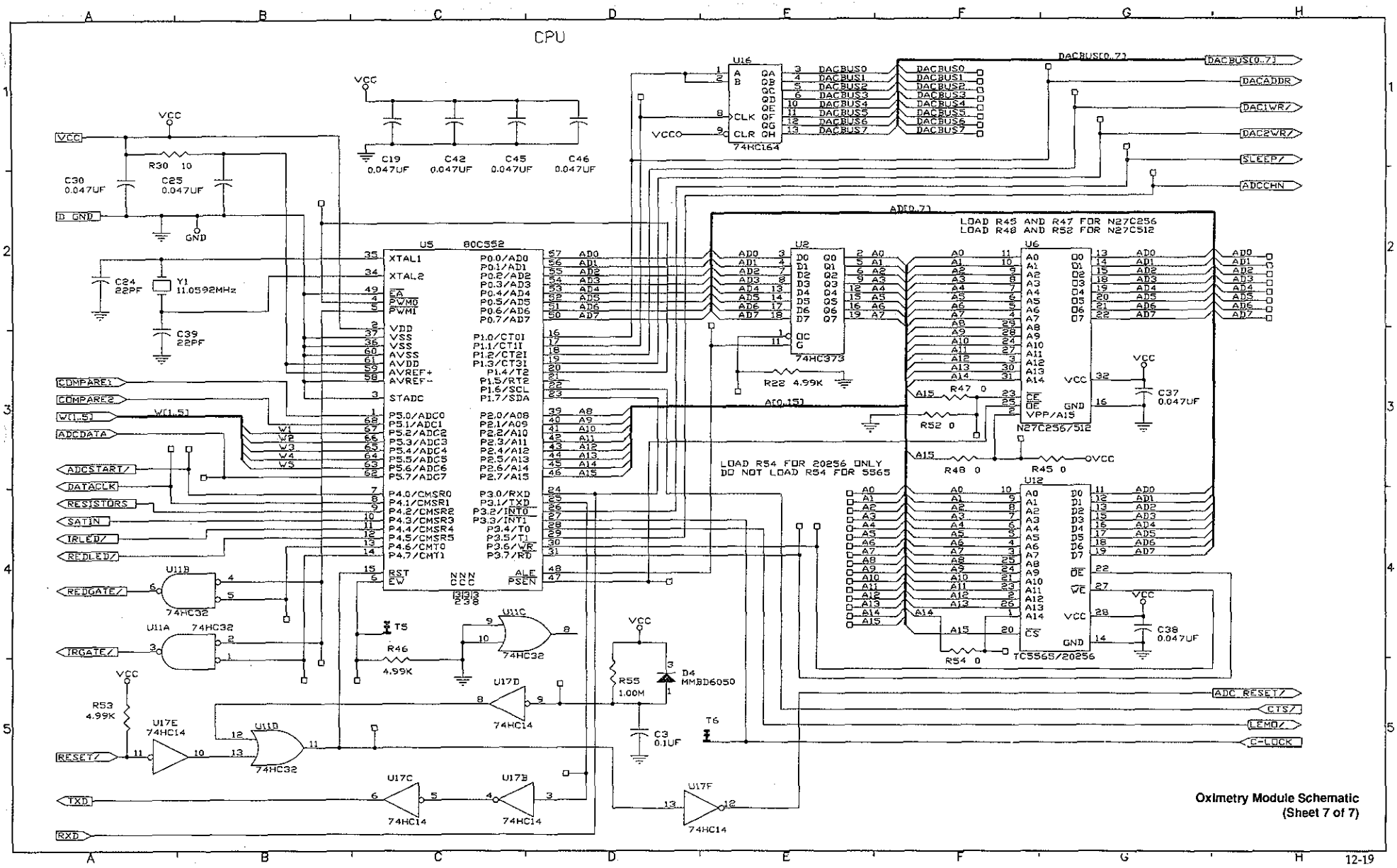

FILTERS
+VA
+VA
S_GND
-VA
-VA
+VAO
C77
0.047UF
R80
75.0K
C78
0.047UF
RED
R14
34.8K
R76
75.0K
C12
0.22UF
U22A
OP490GS
-VAO
C69
0.047UF
R66
34.8K
R15
75.0K
C74
0.047UF
R11
75.0K
C15
0.22UF
U22C
OP490GS
R74
51.1K
C14
0.1UF
R69
100K
-VAO
C76
0.047UF
U23A
TL062
+VAO
C72
0.047UF
T13
RED_ADC
IR
R10
34.8K
R67
75.0K
C64
0.047UF
R70
75.0K
C10
0.22UF
U22D
OP490GS
R79
34.8K
R82
75.0K
C63
0.047UF
R75
75.0K
C17
0.22UF
U22B
OP490GS
R78
100K
C13
0.1UF
R73
100K
U23B
TL062
T14
IR_ADC
REF2.5
R12
100K
C58
0.047UF
R68
1.00K
Oximetry Module Schematic
(Sheet 4 of 7)
12-13



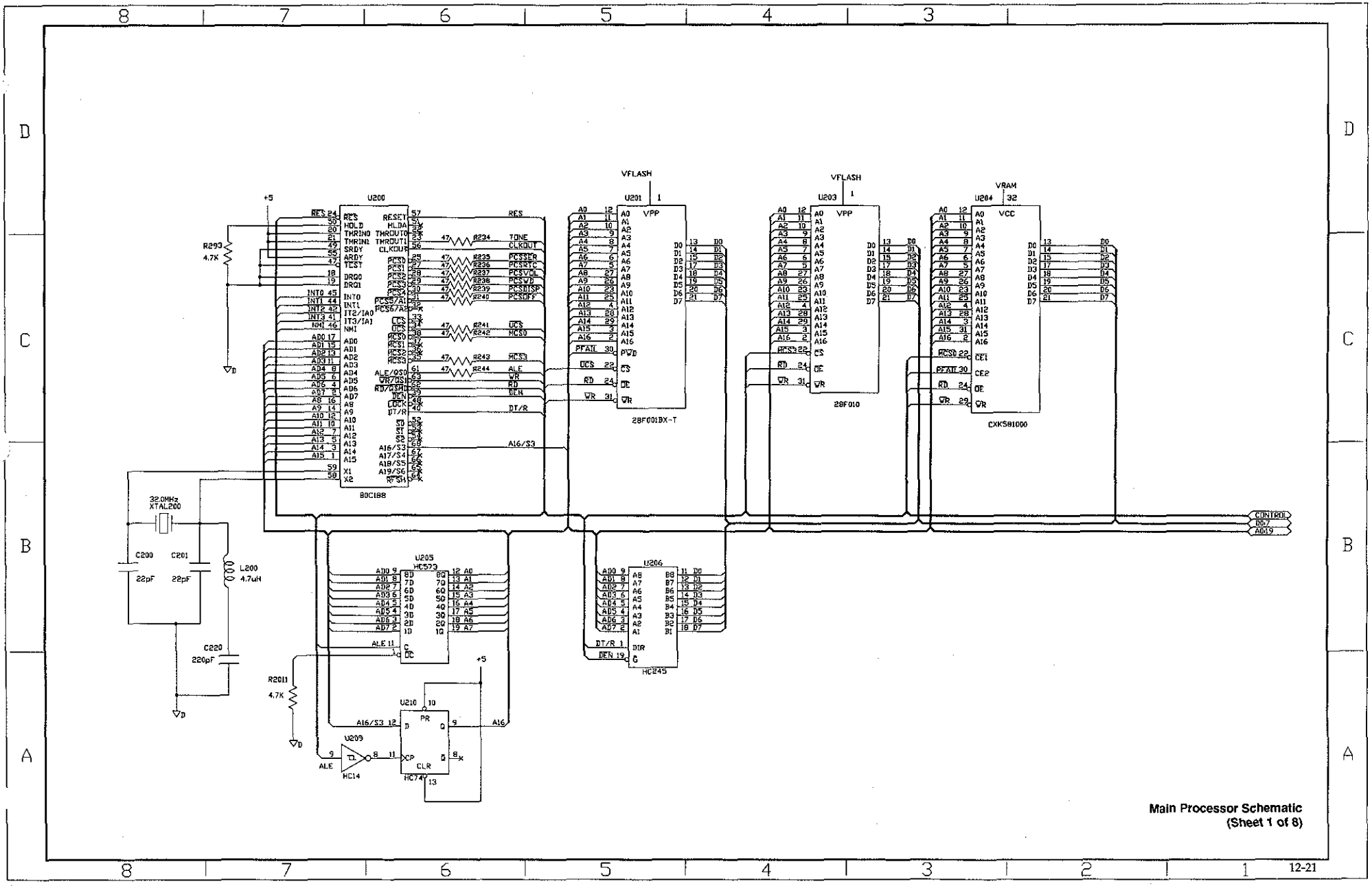

**Oximetry Module Schematic**
**(Sheet 5 of 7)**

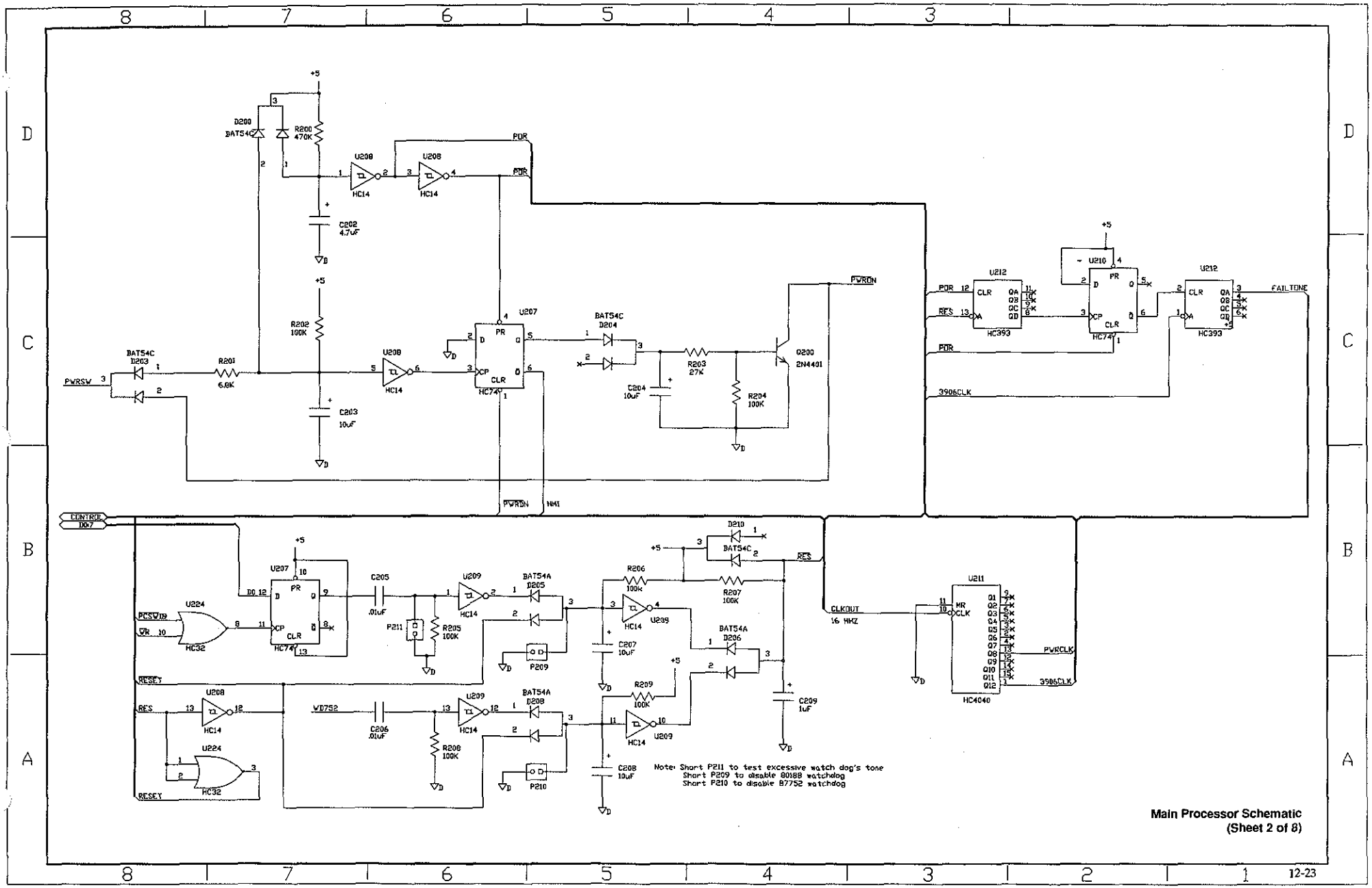
12-15


L.E.D. DRIVER
VCC
-6V
LED GND
S GND
+VA
-VA
+15V
-15V
REDLED/
IRLED/
R24
10
C1
10UF
R6
4.99K
R5
4.99K
Q1
MMBT4403
Q2
MMBT4403
+LED
-LED
R18
10
C26
0.047UF
U3A
TL062
C29
0.047UF
D1
MMBD6050
R31
1.00K
R36
1.00K
Q3
MMBT4401
Q4
MMBT4401
R29
1.00K
T2
Q5
2N7002
R1
10
Q6
2N7002
REF2.5
R13
34.8K
R28
10.0K
C28
0.047UF
U3B
TL062
IR CURRENT
U4B
DG444
R2
100K
R3
1.00K
R4
499K
DACBUS[0..7]
U1
DAC7528
DACADDR
DACWR/
R19
4.99K
C22
1000PF
C21
1000PF
C20
0.047UF
U4A
DG444
R34
1.00K
C27
0.047UF
RED CURRENT
R25
1.00K
C23
0.047UF
Oximetry Module Schematic
(Sheet 6 of 7)
12-17

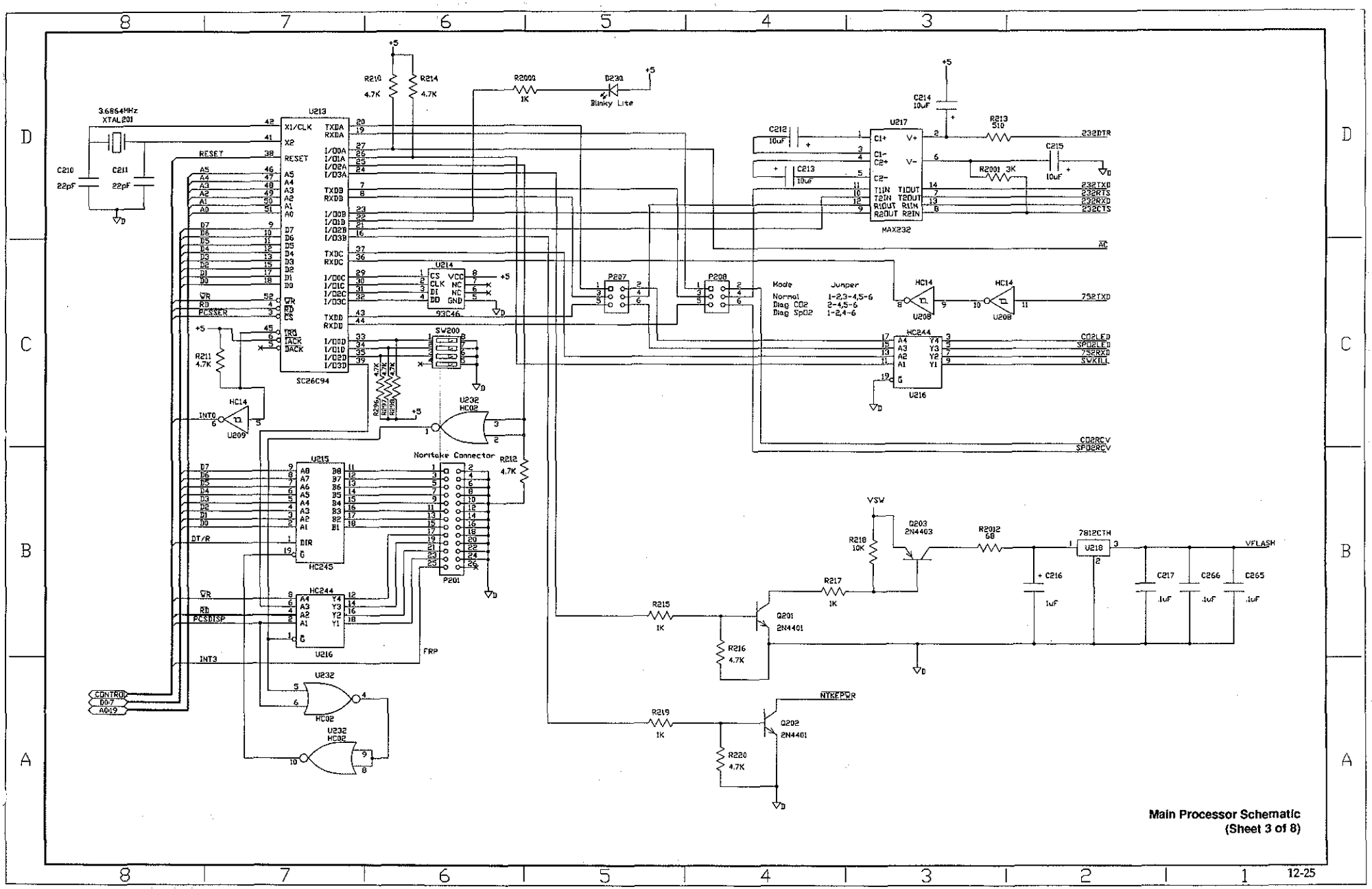



**Oximetry Module Schematic**
**(Sheet 7 of 7)**


U200
80C188
U201
VFLASH
28F001BX-T
U203
VFLASH
28F010
U204
VRAM
CXK581000
U205
HC573
U206
HC245
U209
HC14
U210
HC74
R293
4.7K
R2011
4.7K
C200
22pF
C201
22pF
C220
220pF
L200
4.7uH
32.0MHz
XTAL200
CONTROL
DD7
AD19
Main Processor Schematic
(Sheet 1 of 8)
12-21

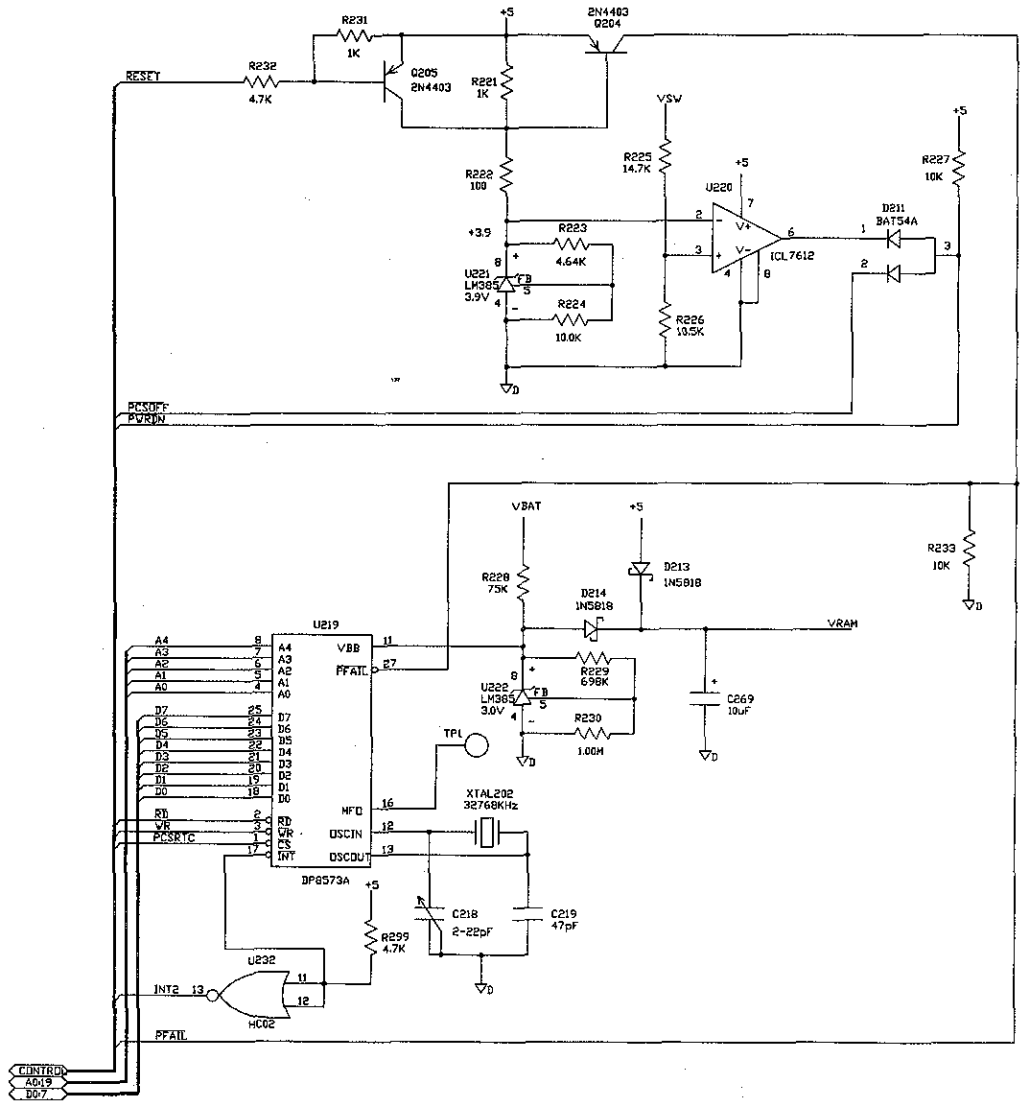



**Main Processor Schematic**
**(Sheet 2 of 8)**

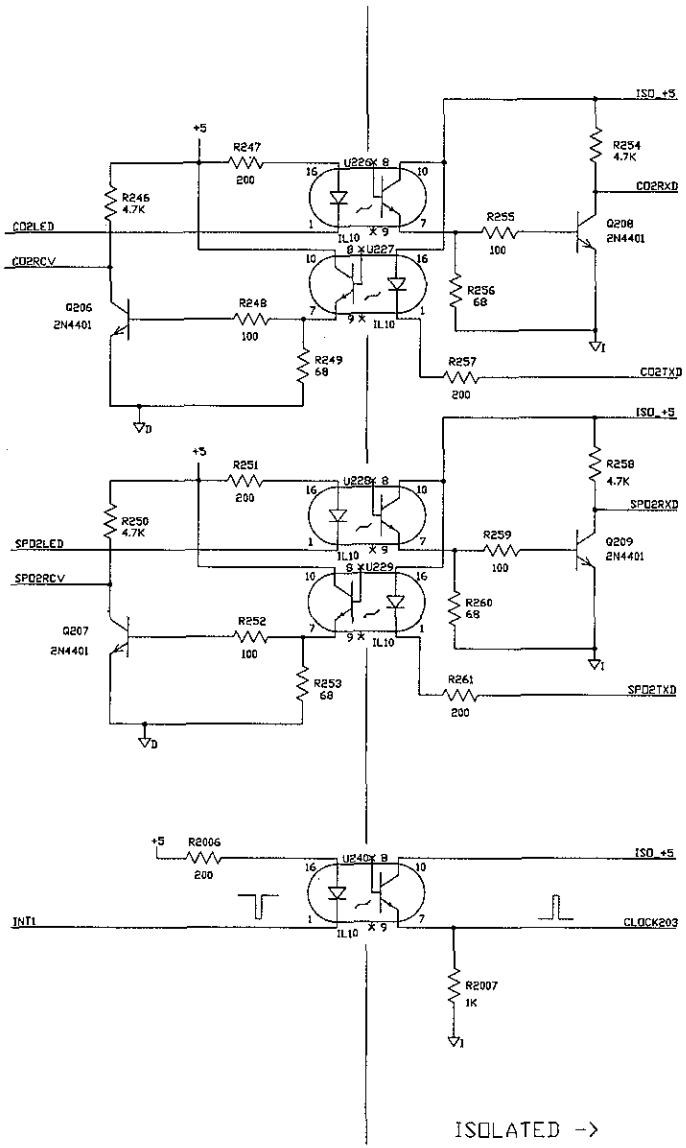



**Main Processor Schematic**
**(Sheet 3 of 8)**

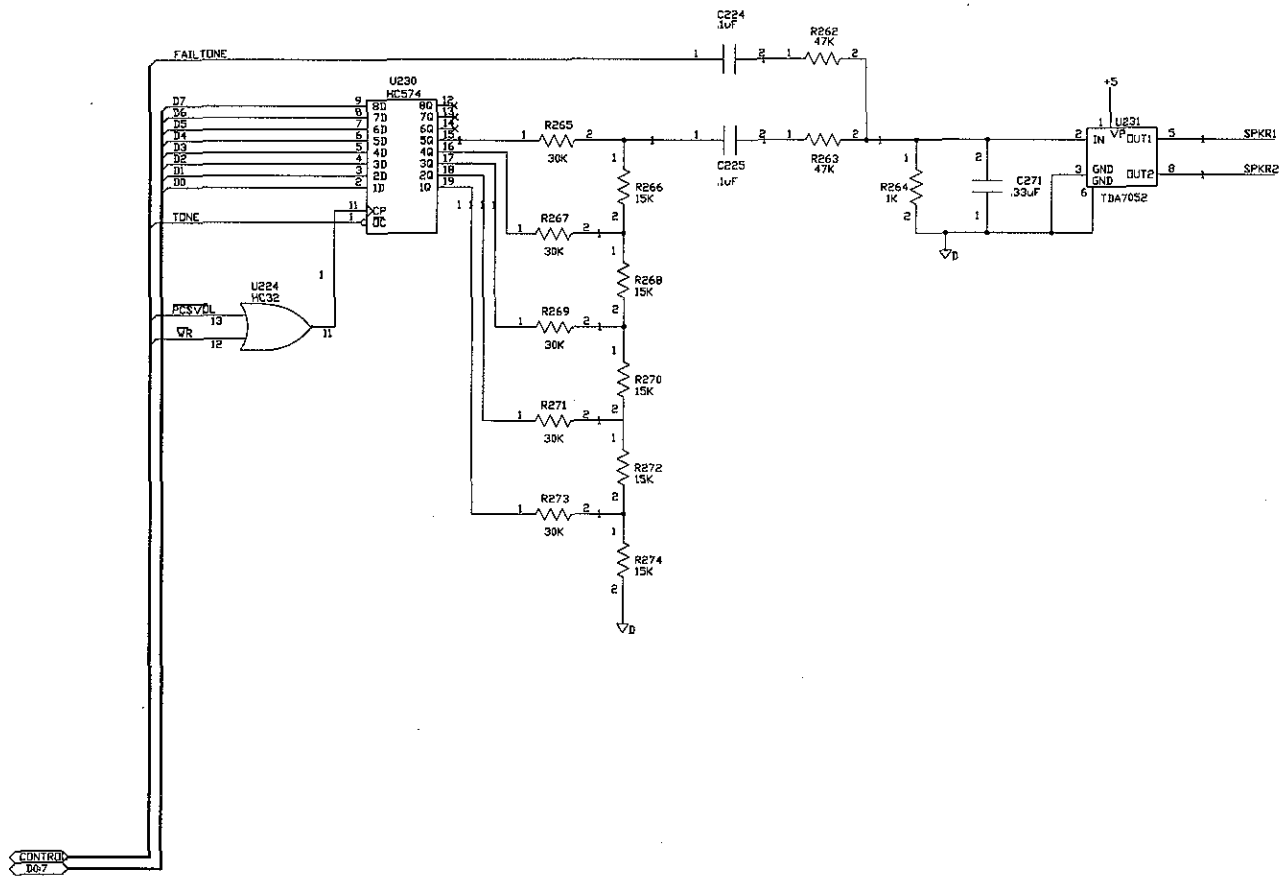
12-25



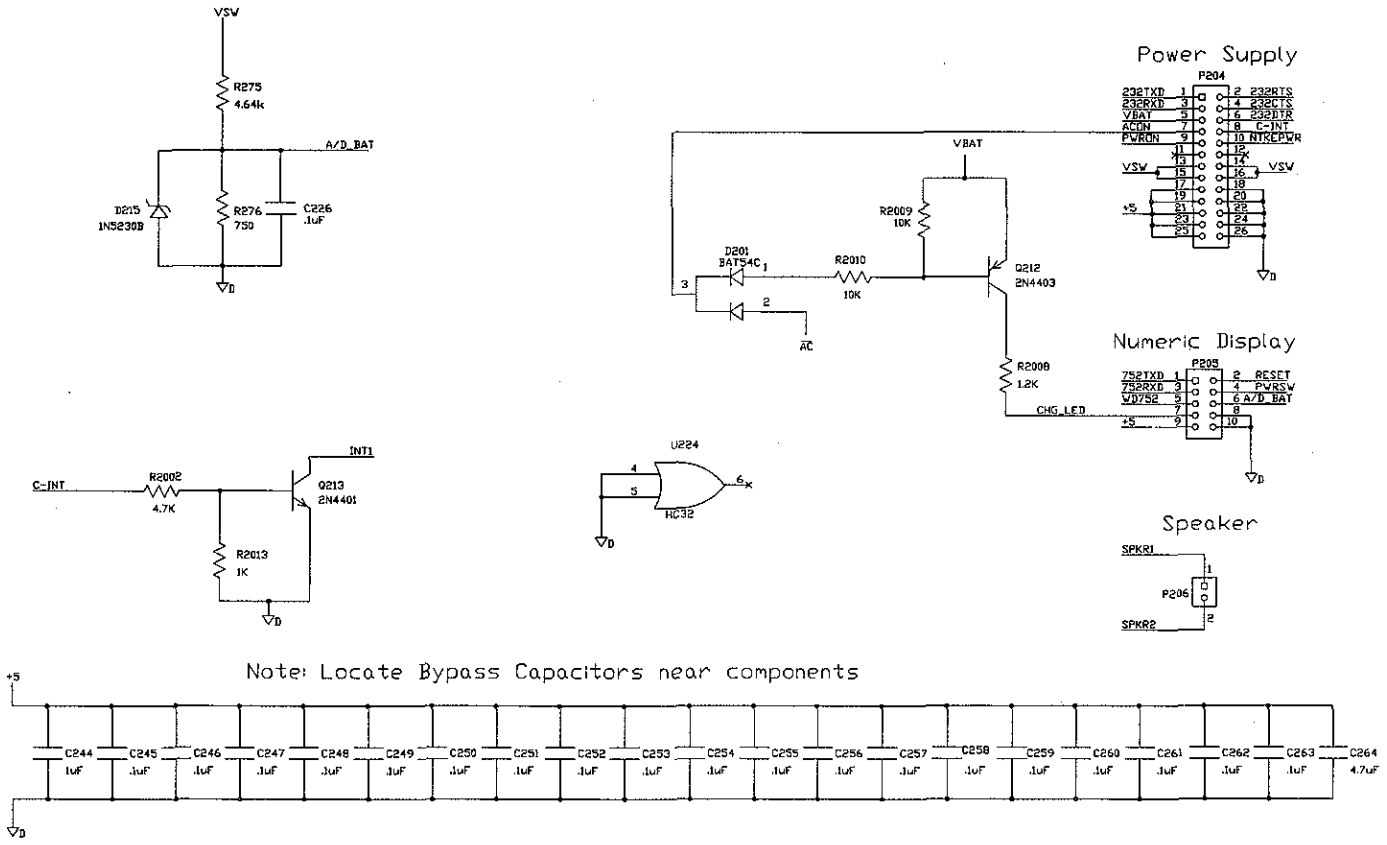

**Main Processor Schematic**
**(Sheet 4 of 8)**



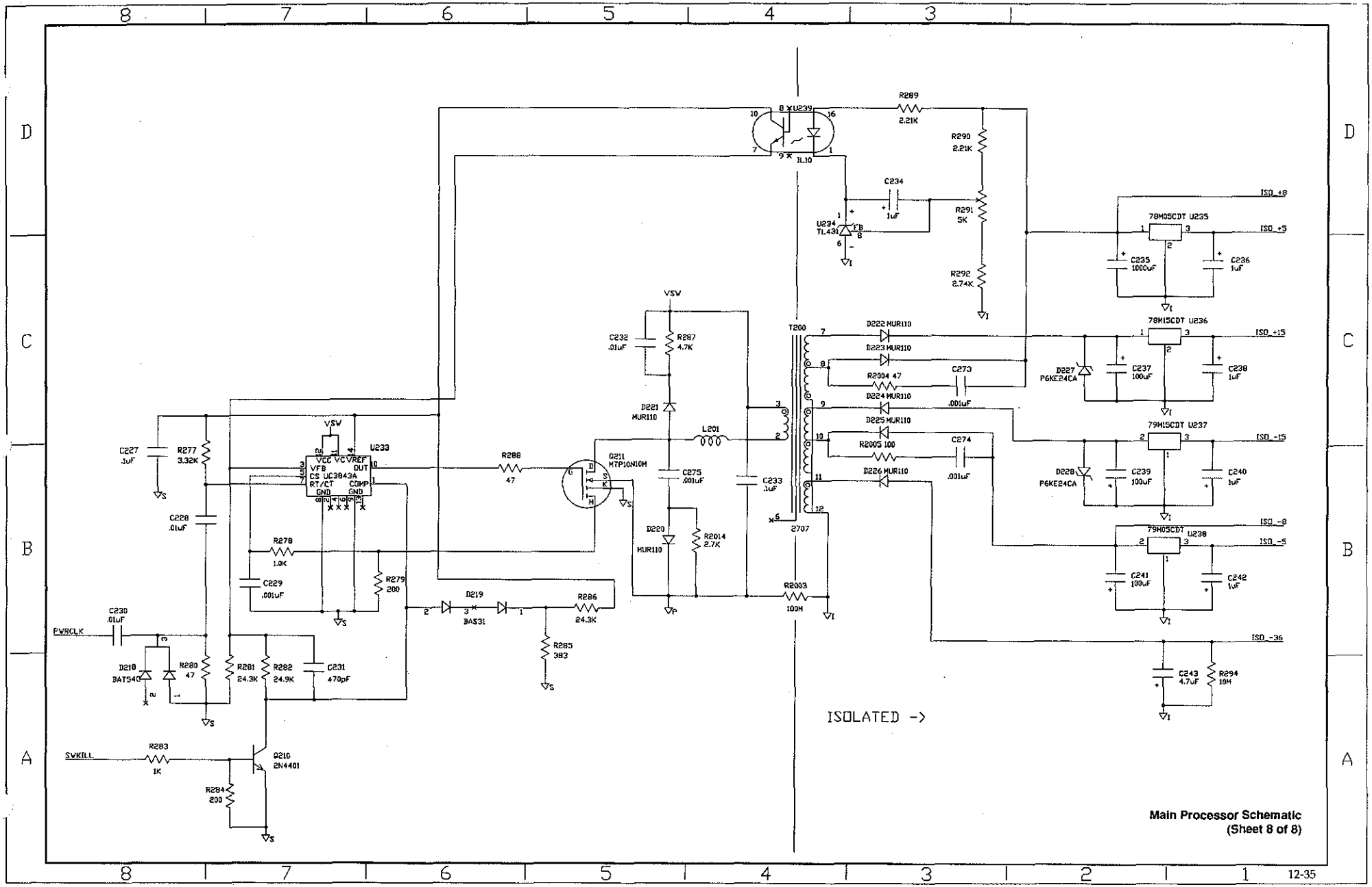

**Main Processor Schematic**
**(Sheet 5 of 8)**

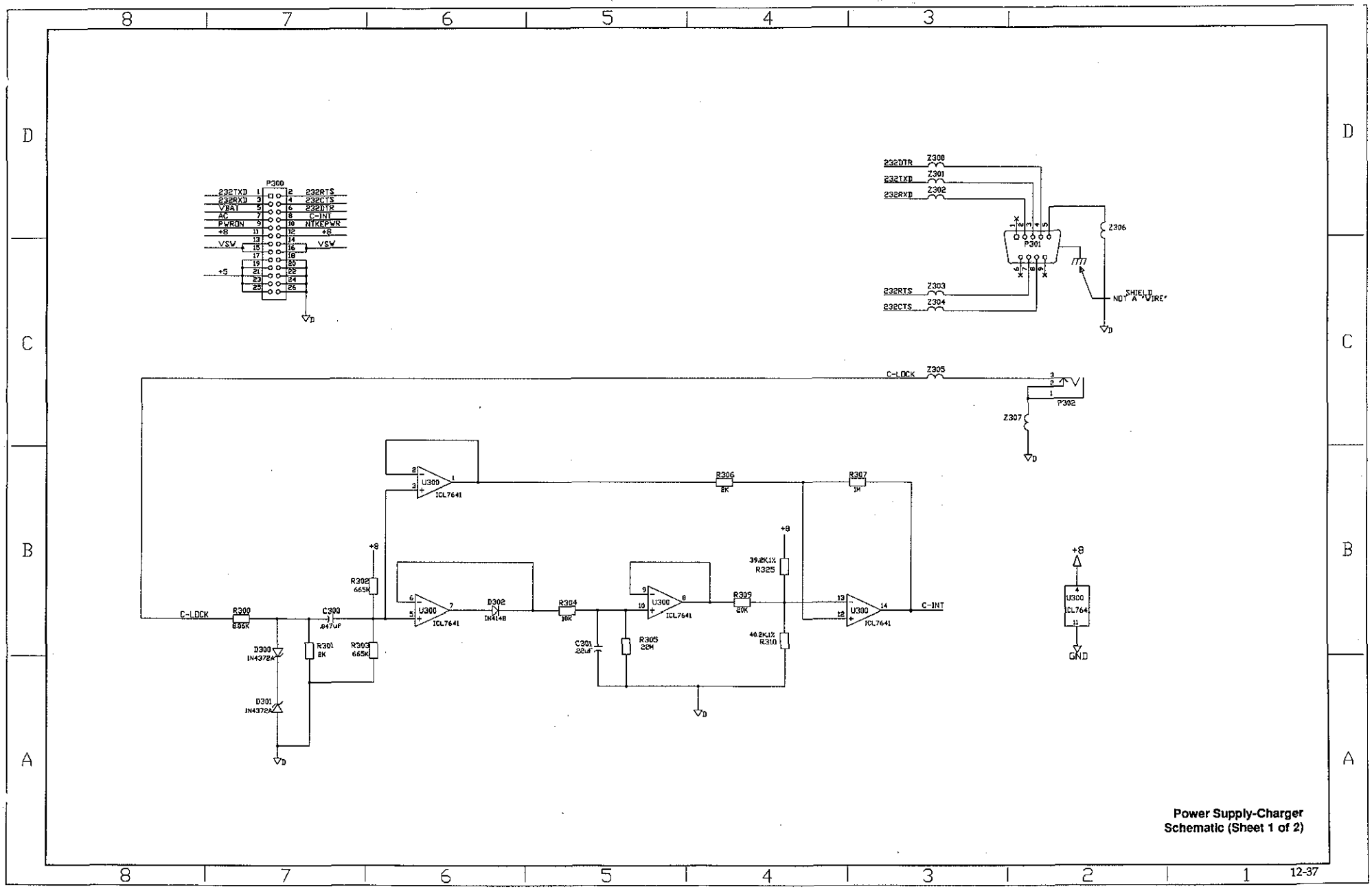



**Main Processor Schematic**
**(Sheet 6 of 8)**




**Main Processor Schematic**
**(Sheet 7 of 8)**

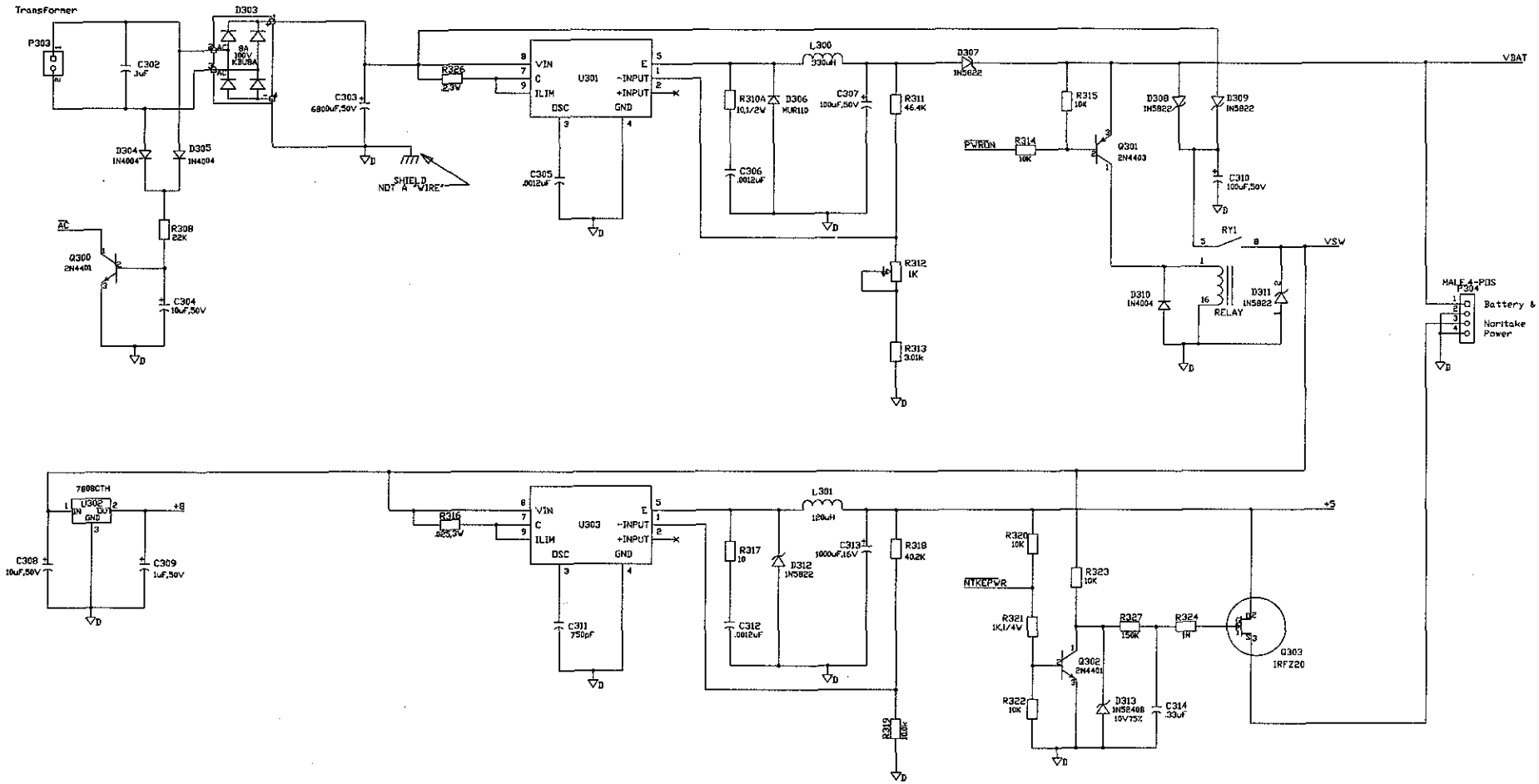

R289
2.21K
R290
2.21K
U239
IL10
C234
1uF
U234
TL431
R291
5K
R292
2.74K
ISO_+8
78M05CDT U235
ISO_+5
C235
1000uF
C236
1uF
VSW
C232
.01uF
R287
4.7K
T200
D222 MUR110
D223 MUR110
78M15CDT U236
ISO_+15
D227
P6KE24CA
C237
100uF
C238
1uF
R2004 47
C273
.001uF
D224 MUR110
D225 MUR110
R2005 100
C274
.001uF
D226 MUR110
79M15CDT U237
ISO_-15
D228
P6KE24CA
C239
100uF
C240
1uF
ISO_-8
79M05CDT U238
ISO_-5
C241
100uF
C242
1uF
ISO_-36
C243
4.7uF
R294
10M
D221
MUR110
L201
C233
.1uF
2707
R2003
100M
C227
.1uF
R277
3.32K
U233
R288
47
Q211
MTP10N10M
C275
.001uF
D220
MUR110
R2014
2.7K
C228
.01uF
R278
1.0K
C229
.001uF
R279
200
D219
BAS31
R286
24.3K
R285
383
C230
.01uF
PWRCLK
D218
BAT54C
R280
47
R281
24.3K
R282
24.9K
C231
470pF
SWKILL
R283
1K
Q210
2N4401
R284
200
ISOLATED ->
Main Processor Schematic
(Sheet 8 of 8)
12-35




**Power Supply-Charger Schematic (Sheet 1 of 2)**



15 S1-04.PLT 06/15/92 16:08:25




**Power Supply-Charger**
**Schematic (Sheet 2 of 2)**